

Claims:

1. An injection device comprising:
 - a housing having a proximate end and a distal end, the distal end having
 - 5 an opening therein;
 - a shield slideably coupled to the housing at said distal end thereof;
 - a cartridge barrel within the housing, the cartridge barrel having proximate
 - and distal ends;
 - a needle cannula fixed to the distal end of the cartridge barrel, or
 - 10 attachment means for fixing a needle cannula to the distal end;
 - a stopper within the cartridge barrel;
 - a driver coupled to the stopper;
 - a spring coupled between the housing and the driver;
 - a driver trigger for retaining the driver fixed to the housing and in which
 - 15 state the spring is in a compressed state, the trigger being actuatable in use to
 - release the driver from the housing thereby allowing the spring to urge the driver
 - through the housing and with it the stopper through the cartridge barrel; and
 - a release mechanism for releasing the spring from the driver at some point
 - on its travel through the housing, whereupon the spring engages the shield and
 - 20 urges the shield away from the housing so as to cover the needle cannula.
2. A device according to claim 1 and comprising means for allowing the
- driver to drive the cartridge barrel through the housing following activation of said
- driver trigger and prior to movement of the stopper through the cartridge barrel,
- 25 thereby urging the needle cannula outward relative to the housing and shield.
3. A device according to claim 1 or 2, the driver trigger being coupled to said
- shield, wherein movement of the shield inwardly with respect to the housing
- activates the trigger.
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4. A method according to claim 3 when appended to claim 2, the trigger

being actuated prior to the emergence of the needle cannula from the shield.

5. A device according to claim 3, the trigger being actuated subsequent to emergence of the needle cannula from the shield.

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6. A device according to any one of the preceding claims, the driver trigger comprising a resilient member on one of the driver and the housing and a complimentary engaging member on the other of the driver and housing, the trigger being actuated by a force of sufficient magnitude applied between the driver and the housing.

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7. A device according to any one of claims 1 to 6, the driver trigger comprising a resilient member on one of the driver and the housing and a complimentary engaging member on the other of the driver and housing, the trigger being arranged to receive a trigger release member of the shield following movement of the shield into the housing.

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8. A device according to any one of the preceding claims, wherein said housing is generally cylindrical in shape and the spring and cartridge barrel are located coaxially within the housing.

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9. An automatic injector for delivering a fluid, comprising: a housing, said housing having a proximate end and a distal end; a shield interfaced with the housing at the housing distal end; said housing and said shield arranged in a sliding relationship forming an enclosure; said driver positioned within said enclosure; a cartridge positioned within said enclosure, said cartridge having a needle extending towards said shield; a barrel, said barrel arranged to contain a stopper and the fluid therein, the fluid in communication with said needle, said driver slidably located within said housing for forcing the fluid through said needle upon activation of said injector; a driver attached to the housing and adapted to disengage from the housing upon activation of the shield; said driver

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further adapted to be biased by a driving unit, said driving unit causing said driver to slide towards said distal end and move said stopper through said barrel to push the fluid through said needle for delivery into an injection site.

- 5 10. The automatic injector of claim 9, wherein said shield displacement and driver disengagement require a substantial force over a short travel distance.

11. The automatic injector of claim 10, wherein said the shield displacement and driver disengagement force required from the user is about 1 kgf.

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12. The automatic injector of claim 10 or 11, wherein the driver disengagement from the housing takes place over the initial part of the shield travel.

- 15 13. The automatic injector of any one of claims 9 to 12, wherein said the force exerted by the automatic injector on the shield is minimal during delivery.

14. The automatic injector of one of claims 9 to 13, further comprising an automatic retracting mechanism that automatically retracts said shield after the
20 completion of injection.

15. The automatic injector of claim 14, having driver arranged to allow the driving unit to force the retraction of the shield and shielding the needle at the end of delivery.

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16. The automatic injector of one of claims 9 to 15, said housing including a set of supports extending longitudinally from said proximate end of the housing, said supports adapted to abut said cartridge barrel and prevent axial movement of said cartridge before, during and after operation of the automatic injector.

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17. The automatic injector of one of claims 9 to 16, wherein said driver

includes a set of cartridge barrel supports extending longitudinally and sliding on the external surface of the barrel during injection.

18. The automatic injector of claim 17, wherein said cartridge barrel supports
5 are adapted to detect the end of barrel and release the driving unit.

19. The automatic injector of one of claims 9 to 18, wherein said driving unit is
a spring arranged to bias said driver to push said stopper into said barrel and
then move said shield into a needle shielding position.

10 20. The automatic injector of claim 19, wherein the released spring provides to
the user with a tactile and audible feedback of the end of delivery.

21. The automatic injector of one of claims 9 to 20, wherein said driver
15 protrusions releasably engage said housing.

22. The automatic injector of any one of claims 9 to 21, said housing having
an opening at said proximate end, said injector further comprising a rod
extending through said opening and arranged to push said stopper into said
20 barrel before activation of said injector.

23. The automatic injector of claim 22, said rod having a smooth surface for
axial movement in relation to said housing opening.

25 24. The automatic injector of claim 22, said rod having a threaded section for
rotational axial movement in relation to said housing opening.

25. The automatic injector of claim 23, said rod having a serrated edge for
incremental axial movement in relation to said housing opening.

30 26. The automatic injector of one of claims 9 to 25, further comprising a safety

tab removably engaged with said enclosure, said tab arranged to prevent activation of said injector when said tab is engaged with said enclosure.

27. The automatic injector of one of claims 9 to 26, said cartridge comprising a
5 barrel having a closed distal end and a proximate end, said needle having a
distal end for exposure to the injection site and a proximate end arranged to
penetrate said closed distal end of the cartridge and provide fluid communication
between the distal end of the needle and the interior of the cartridge, said
proximate end of said cartridge arranged to accept said driver.

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28. The automatic injector of any one of claims 9 to 27, said shield having an
inner circumferential wall and an outer circumferential wall, said housing having
an inner circumferential wall and an outer circumferential wall, said housing and
said shield arranged in a sliding relationship, said housing and said automatic
15 injector having an arrangement for latching the shield in the needle shielding
position.

29. The automatic injector of claim 28, said enclosure further comprising a leaf
spring at said distal end of the enclosure, said leaf spring arranged to abut said
20 driving unit after retraction of said shield and prevent potential re-exposure of
said needle.

30. The automatic injector of claim 28 or 29, said enclosure further comprising
pins and "pattern" arranged at said distal end of enclosure, said pins and
25 "pattern" arranged to interact during the use of the automatic injector and prevent
potential re-exposure of said needle.

31. The automatic injector of claim 21, said activation occurring after
application of the axial pressure on the housing of the injector; said shield moving
30 to expose the needle and to separate said driver latches from said housing to
allow axial movement of said driver and said stopper in said barrel, holding said

injector at the injection site for the duration of the injection.

32. The automatic injector of claim 28, said housing and shield further include a window arranged to allow viewing of the barrel, the barrel scale and the fluid in the barrel.

33. The automatic injector of claim 32, said housing and said shield further having two matching slots in conjunction forming the window.

34. The automatic injector of claim 32, said housing and said shield further having two matching openings in conjunction forming the window.

35. The automatic injector of claim 28, said shield outer circumferential wall arranged in a sliding relationship with said housing inner circumferential wall.

36. The automatic injector of claim 28, said shield inner circumferential wall arranged in a sliding relationship with said housing outer circumferential wall.

37. The automatic injector of claim 33, said housing further having an extended section enveloping said shield and providing improved holding ability for the user.

38. An automatic injector for delivering a fluid, comprising: a housing, said housing having a proximate end and a distal end; a shield interfaced with the housing at the housing distal end; said housing and said shield arranged in a sliding relationship forming an enclosure; said driver positioned within said enclosure; a cartridge positioned within said enclosure, said cartridge having a needle extending towards said shield; a barrel, said barrel arranged to contain a stopper and the fluid therein, the fluid in communication with said needle; a rod arranged to communicate with said stopper before the activation, said rod arranged to move said stopper for titration before the activation and to

automatically separate from said stopper upon activation; said driver slidably located within said housing for forcing the fluid through said needle upon activation of said injector; a driver attached to the housing and adapted to disengage from the housing upon activation of the shield, said driver further adapted to slide within said housing; said driver further adapted to be biased by a driving unit and said driving unit causing said driver to slide towards said distal end and move said stopper through said barrel to push the fluid through said needle for delivery into an injection site.

39. The automatic injector of claim 38, said housing having an aperture on the proximate end, said rod arranged to extend into said aperture during communication with said stopper and move said stopper during titration.

40. The automatic injector of claim 39, said rod having a section for axial movement in relation to said housing opening.

41. The automatic injector of claim 39, said rod having a threaded section for rotational axial movement in relation to said housing opening.

42. The automatic injector of claim 39, said rod having a serrated edge for incremental axial movement in relation to said housing opening.

43. The automatic injector of claim 38, said injector further including a window arranged to allow viewing of the cartridge fluid.

44. An injector for automatically injecting and delivering fluids into a living being, said injector comprising:

a housing having a first proximal end and a first distal end that is open;
a cartridge having a barrel containing a fluid, said cartridge further comprising a displaceable stopper at a second proximal end and a needle at a second distal end, said cartridge being fixed within said housing;

a driver engaged within said housing for driving said stopper to dispense the fluid from said barrel and through said needle when disengaged from said housing;

5 a needle shield being in sliding engagement with said first distal end of said housing and comprising an opening for permitting said needle to pass therethrough; and

10 a single spring, engaged with said driver, that is released by a user force, said single spring displacing said driver for automatically injecting and delivering the fluid into the living being and for automatically acting against the needle shield to remove the needle from the living being while concealing the needle once the fluid delivery is complete.

45. An automatic injector for delivering a fluid, comprising:

15 a housing, said housing having a proximate end and a distal end;
a shield interfaced with the housing;
said housing and said shield arranged in a sliding relationship forming an enclosure;

20 said driver positioned within said enclosure;
a cartridge positioned within said enclosure, said cartridge having a needle extending towards said shield;

a cartridge barrel, said barrel arranged to contain a stopper and the fluid therein, the fluid in communication with said needle, said driver slidably located within said housing for moving the needle forward to insert it into tissue and for forcing the fluid through said needle upon activation of said injector;

25 a driver attached to the housing and adapted to disengage from the housing upon activation of the injector;

30 said driver further adapted to be biased by a driving unit and said driving unit causing said driver to slide towards said distal end to forward the cartridge with the needle and move said stopper through said barrel to push the fluid through said needle and deliver fluid into an injection site.

46. The automatic injector of claim 45, wherein said shield displacement requires a substantial force over a short travel distance.

5 47. The automatic injector of claim 46, wherein the shield displacement force is sufficient to ensure rapid housing and shield disengagement.

48. The automatic injector of claim 45, wherein said the force exerted by the shield of the automatic injector on the tissue is minimal during delivery.

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49. The automatic injector of claim 48, wherein the shield and the housing have latches maintaining the relative housing to shield position during delivery.

15 50. The automatic injector of claim 45, wherein the force exerted by the automatic injector moves the cartridge toward the distal end of the automatic injector to insert the needle into tissue and deliver the drug.

20 51. The automatic injector of claim 45, further comprising a mechanism that automatically retracts said shield and shields the needle after the completion of injection.

25 52. The automatic injector of claim 51, having a driver arranged to allow the driving unit to force the shield in the distal direction and shield the needle at the end of delivery.

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53. The automatic injector of claim 45, said housing including a support extending longitudinally from said proximate end of the housing, said support adapted to abut said cartridge barrel and prevent axial movement of said cartridge before use.

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54. The automatic injector of claim 45, wherein said shield includes protrusions extending longitudinally from the distal end and limiting cartridge motion toward the distal end of the injector after activation.

5 55. The automatic injector of claim 45, wherein said driver includes a set of cartridge barrel supports extending longitudinally and sliding on the external surface of the barrel during injection.

56. The automatic injector of claim 55, wherein said cartridge barrel supports
10 are adapted to detect the end of barrel and release the shield.

57. The automatic injector of claim 55, wherein said driver has protrusions supporting the barrel from axial motion toward the distal end of the automatic injector after injection completion.

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58. The automatic injector of claim 45, wherein said driving unit is a spring arranged to bias said driver to push said cartridge to insert the needle into tissue, to push said stopper into said barrel and then move said shield into needle shielding position.

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59. The automatic injector of claim 58, wherein said the released spring provides to the user a tactile and audible feedback of the end of delivery.

60. The automatic injector of claim 45, said driver protrusions releaseably
25 engage said housing.

61. The automatic injector of claim 60, said activation occurring after application of an axial force on the shield of the injector; said shield moving to separate said driver latches from said housing to allow and said holding said
30 injector at the injection site for the duration of the injection.

62. The automatic injector of claim 45, said cartridge comprising a barrel having a closed distal end and a proximate end, said needle having a distal end for exposure to the injection site and a proximate end arranged to penetrate said closed distal end of the cartridge and provide fluid communication between the distal end of the needle and the interior of the cartridge, said proximate end of said cartridge arranged to accept said driver.

63. The automatic injector of claim 45, said shield having an inner circumferential wall and an outer circumferential wall, said housing having an inner circumferential wall and an outer circumferential wall, said housing and said shield arranged in a sliding relationship, and said automatic injector having arrangements for latching the shield to the housing.

64. The automatic injector of claim 63, said shield further comprising a hook at said distal end and the housing comprising matching windows at distal end for engaging the shield and housing in storage and delivery positions.

65. The automatic injector of claim 63, said shield further comprising a leaf spring said leaf spring arranged to abut said driving unit after retraction of said shield and prevent potential re-exposure of said needle.

66. The automatic injector of claim 45, further comprising a safety tab removably engaged with said enclosure, said tab arranged to prevent activation of said injector when said tab is engaged with said enclosure.

67. The automatic injector of claim 63, said housing and shield further include a window arranged to allow viewing of the barrel, the barrel scale and the fluid in the barrel.

68. The automatic injector of claim 67, said housing and said shield further having matching openings across diameter in conjunction forming the window.

69. The automatic injector of claim 45, wherein said injector is equipped with a safety tab said shield proximate displacement requires the removal of the safety tab.

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70. The automatic injector of claim 45, wherein said the injector is equipped with a needle cover assembly cup, said shield proximate displacement requires the removal of the cup together with the needle cover assembly.